Paper-based Analytical Devices

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Recently, “Paper-based analytical devices” have attracted much attention. Sun et al. reported on “Screen Printed Paper-based Diagnostic Devices with Polymeric Inks”, describing a simple and low-cost fabrication method for paper-based diagnostic devices. Simultaneous measurements of pH and glucose were successfully demonstrated. Ogawa et al. reported on the “Determination of Iron Ion in the Water of a Natural Hot Spring Using Microfluidic Paper-based Analytical Devices”, describing a simple determination of iron ions. They designed four channels in a single paper device, and evaluated the precision and accuracy of the developed device. Hori et al. reported on the “Impedance Analysis of Colloidal Gold Nanoparticles in Chromatography Paper for Quantitation of an Immunochromatographic Assay”, describing a solution resistance-based detection of gold nanoparticles. The relationship between solution resistance and gold nanoparticle concentration was investigated, and the results are also shown as color photos. Mujawar et al. reported on “Hexamethyldisilazane Modified Paper as an Ultra-sensitive Platform for Visual Detection of Hg²⁺, Co²⁺, Zn²⁺ and the Application to Semi-quantitative Determination of Hg²⁺ in Wastewater”, describing the application of hexamethyldisilazane (MHDS) modified filter paper for the ultrasensitive detection of metal ions. They used different chromogenic reagents, such as HOTT, dithizone, and 5-Br-PADAP, and successfully applied them to the determination of the above-mentioned ions. Sittiwong et al. reported on a “Paper-based Platform for Urinary Creatinine Detection”, while describing a new paper platform for the colorimetric detection of creatinine. Here, a urine creatinine determination was carried out using a paper-based method, and the results were compared with those of the spectrophotometric method. The recovery of creatinine from a spiked sample (93.5 to 110.9%), limit of detection (4.2 mg/L), and relative standard deviation (less than 10%) were reported. Yan et al. reported on “An Inkjet Printing Strategy for Extensive Exploration of One Chemical Action with Three Interactive Variations”, while describing a simple method to study the effects of three chemical factors to the ninhydrin reaction. Employing an inkjet printing technique allows one to obtain much information by a single experiment. Cheng et al. reported on the “Determination of Aluminum in Edible Jellyfish Using Chrome Azurrol S with Spot Test on Filter Paper”, while describing the development of a household procedure for a rapid test determination of Al in edible jellyfish. The results were compared with those obtained by ICP-MS, and comparative values were obtained. Tominaga et al. reported on “Quantitative and Single-step Enzyme Immunosensing Based on an Electrochemical Detection Coupled with a Lateral-flow System”, while describing a single-step electrochemical immunosensography. A successful determination of proteins with nanomolar concentrations was described.

“Paper-based analytical devices” provide an inexpensive, simple, and easy-to-use platform to detect various analytes. Recently, specific review papers on this topic involving colorimetric detection, electrochemistry, fabrication and biological testing applications, and medical diagnostics have appeared in many journals. Thus, this research field is still considered to be a growing one. Further developments in this field are expected to commercialize many practical devices for various analytical fields, including clinical analysis, environmental analysis, and food analysis.

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References


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